Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

Citation analysis and reliance measurement on different information resources: A survey of masters' theses

2006, Master thesis article
By: Azam Dabiri, Master student of Library and Information Science
Department of Library and Information Science,
Ferdowsi University of Mashhad (FUM) - Iran
Email: sammy.dabiri@gmail.com

Abstract:

This survey reports the results of a citation analysis of masters' theses of agriculture engineering students of Ferdowsi University of Mashhad (FUM) and self-reliance in resource use. 11686 citations out of 125 theses written during 2000-2004 were analyzed to determine the number and percentage of citations to the resources published by agricultural school of FUM, resources published in Iran and resources published out of Iran. Analytical test used was the chi-square test and findings demonstrates that the number of citations to published resources of agricultural school were 867 citations (7.41%), while resources published in Iran were 1115 citations (9.54%), and resources published out of Iran allocated 9704 citations(83.3%) to them. There was a significant difference between citations to published resources of agricultural school and resources published in Iran. There was also a significant difference between [agricultural school of FUM published resources & published resources in Iran] and resources published out of Iran cited by theses. Findings indicated that between printed materials, journals with 7173 citations (62.15%), books with 2589 citations (22.43%) and conferences' articles with 1056 citations (9.15%) allocated the most citations to them respectively. Between electronic materials, journals with 102 citations (69.86%) and conferences' articles with 5 citations (3.42%) allocated the most citations to them respectively. Frequency distribution of citations showed that the printed materials allocated 11540 citations (98.75%) of citations to them, while electronic resources allocated 146 citations (1.24%) to them. Findings also represented that there was an increase in the number of citations to electronic (online) resources by passing the time. There was also a significant difference between the number of citation to the electronic resources published in FUM, in Iran and out of Iran. Geographical distribution of citation showed that the publications of the United States of America were the most cited by theses (45.07%). Language distribution of citation showed that the English publications were the most cited by theses (85.89%).

Keywords: citation, citation analysis, theses, self-reliance, reliance, agricultural, Ferdowsi university of Mashhad, Iran, library, library resources, printed resources, electronic resources.

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

Introduction:

Citation analysis is the measures to assess the scientific literature based on citation count. A scientific paper does not stand alone; it is embedded in the literature of the subject (Ziman, 1968). A reference is the acknowledgment that one document guides to another; a citation is the acknowledgment that one document receives from another. In general, a citation implies a relationship between a part or the whole of the cited document and a part or the whole of the citing document. Citation analysis is that area of bibliometrics which deals with the study of these relationships (Smith, 1981). Garfield et al (1978) defined Citation analysis as a bibliometric method that uses reference citations found in scientific papers as the primary analytical tool. Lancaster (1991) stated that "research productivity and impact is measured through an analysis of the number of publications produced and the quality of the sources in which the published resources appears." This implies that sources of citation are important in determining the quality of a work. Citation analysis reveals interesting information about knowledge producers in terms their information seeking behavior and usage of various information sources. It can highlight the familiarity, awareness and usage of knowledge producers regarding the online and print information sources. Citation analysis examines the frequency, patterns and graphs of citations in articles and books (Garfield, 1979). Diodato (1994) defined citation as "A wide-ranging area of bibliometrics that studies the citations to and from documents. Such studies may focus on the documents themselves or on such matters as: their authors; the journals (if the documents are journal articles) in which the articles appear; the organizations or countries in which the documents are produced; the purpose of the citations."

Established in 1973, the School of Agriculture of Ferdowsi university of Mashhad (FUM) has the departments of Agricultural Economics, Agricultural Machinery, Agronomy, Animal Sciences, Food Science Industry, Gardening, Plant Pathology, Plant Breeding and Biotechnology, Soil Sciences, and Water Engineering. The College of Agriculture offers 10 programs: Agricultural Economics, Agricultural Machinery, Agronomy, Animal Sciences, Food Industry Science, Gardening, Plant Pathology, Plant Breeding and Biotechnology, Soil Sciences, and Water Engineering; these programs are offered at the Bachelor's, Master's, and Ph.D. levels which undertook different researches in the format of university theses .

Considering the increasing number of these theses in School of Agriculture of FUM, there is still no research has conducted to provide information about the sources these theses cite to, the measure of citations. So there is no information about how much the students use the resources and databases which costs lots of efforts and budget for the university. So the main part of this survey tends to determine that in searching for and writing their theses, Master students of agriculture engineering of FUM:

- How much relied on published resources of agricultural school/ FUM
- How much relied on published resources in Iran
- How much relied on published resources of out of Iran

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

Objectives:

The objectives of this survey are:

- To determine the number and percentage of citations to published resources of agricultural school of FUM
- To determine the number and percentage of citations to published resources in Iran
- To determine the number and percentage of citations to published resources out of Iran
- To determine if there is a significant difference between citations to agricultural school of FUM published resources and published resources in Iran
- To determine if there is a significant difference between citations to [agricultural school of FUM published resources & published resources in Iran] and published resources out of Iran
- To identify distribution of citations to different types and formats of resources
- To identify core journals in every field, published in Iran and out of Iran
- To determine the frequency distribution of the number of citations to printed and electronic resources.
- To determine if there is a significant increase in the number of citations to electronic (online) resources, by passing the time
- To determine if there is a significant difference between citations to electronic resources published by agricultural school of FUM, citations to electronic resources published in Iran, and citations to electronic resources published out of Iran
- To identify the geographical distribution of the citations
- To identify the language distribution of the citations

Scope of the survey:

The survey covers a period of five years, from 2000 to 2004 masters' theses of students of Ferdowsi University of Mashhad (FUM). This period of time is chosen because masters' theses of students of FUM before 2000 were not available. The years covered helped ensure a sufficient number of works that have been assessed by external examiner.

Research Methodology:

Citation analysis is the research method used in this survey. The population of the study is all the master theses of agriculture engineering students of Ferdowsi University of Mashhad (FUM) who graduated from 2000-2004. There were 197 theses available. 125 of them (containing 11686 citations) were sampled with quota sampling and studied.
The theses were consulted using descriptive methods and analytical methods. Descriptive methods used to collect the information needed. The data collected were analyzed using percentages and means. Besides, analytical methods (the chi-square test) used to determine the difference between citations to

published resources of agricultural school of FUM, resources published in Iran and resources published out of Iran.

Literature Review:

Reliance on organization resources, presented on Oppenheim[1] 's study. He used citation analysis to assess the research performance of academic programs or research institutes, and individual researchers or faculty members. His study on 1991 in the United Kingdom suggested that citation count for faculty members was a good method for ranking library schools or departments. All 622 citations received in Social Scisearch for articles published since 1988 by the 217 academics teaching in UK library and information science schools were gathered. They were then used to rank schools and compared to the ratings awarded to the schools by the Universities Funding Council Research Assessment Exercise in 1992. There was a good correlation between the total number of citations received by a school-or the average number of citations received by each academic in the department-and the rating given to the school by the Assessment Exercise. (Rochester, 1996)

Reliance on national resources was represented in Herman[2] 's study, entitled "Receptivity to foreign language: a comparison of UK and US citing behavior in librarianship and information science". In this study, he compared UK and US behavior in citing foreign literature. Citation data were collected for articles published in 29 English-language library and information science journals for a year's publication cycle starting in 1987, yielding 478 useable articles containing citations for English language periodical literature published between1980-87. The 2008 useable citations were then categorized according to the nationalities of the citing author/journal as well as the cited journal to identify national citation patterns for the UK and US. As we would expect, UK and US journals received more than 91% of the master list citations. When the UK and US citation data were analyzed, it was found that citations for UK authored/published articles were 50% to UK published journals, 42% to US journals and 8o/c to other journals. For American articles, citations were 91% to US journals, 5% to UK journals and 4% to other journals. Self-citation accounted for 19% of citations in UK articles and 17% in US. There were problems with the selection of journals for the source list (five of nine had an international orientation), which gave a low concentration of UK authors published in the UK source journals. Herman concluded that 'UK journals demonstrated much greater receptivity to foreign literature than did the US journals', and that US journal literature could be called "parochial". The sheer quantity of American library and information science literature did not appear to be the cause for it being cited more. Herman wondered if UK literature was perceived to be of inferior quality. (Rochester, 1996)

[1] - Oppenheim, Charles (1995). The correlation between citation counts and the 1992 research assessment exercise rating for British Library and information science university departments. ***Journal of Documentation,*** 51: 18-27.

[2] - Herman, I (1991). Receptivity to Foreign Literature: A Comparison of UK and US Citing Behavior in Librarianship and Information Science. ***Library and Information Science Research,*** 13: 37-47.

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

Research findings:

- Table 1: Number and percentage of citations to published resources of agricultural school of FUM in every field

Rank	Field	Number of citations	Percentage of citations
1	Agronomy	411	47.4
2	Animal science	201	23.18
3	Irrigation engineering	124	14.3
4	Food science & technology	74	8.53
5	Plant pathology	29	3.34
6	Soil science	28	3.22
	Total	867	100

- Table 2: Number and percentage of citations to published resources in Iran in every field

Rank	Field	Number of citations	Percentage of citations
1	Agronomy	279	25.02
2	Soil science	238	21.34
3	Irrigation Engineering	200	17.93
4	Animal science	175	15.69
5	Food Science & Technology	112	10.04
6	plant pathology	111	9.95
	Total	1115	100

- Table 3: Number and percentage of citations to published resources out of Iran in every field

Rank	Field	Number of citations	Percentage of citations
1	Agronomy	3691	38.03
2	Animal science	2479	25.54
3	Food Science & Technology	1198	12.34
4	plant pathology	865	8.91
5	Soil science	857	8.83
6	Irrigation Engineering	614	6.32
	Total	9704	100

- Table 4: The chi-squared test is used to determine whether there is a significant difference between the observed number of citations to published resources of agricultural school of FUM and the observed number of citations to published resources in Iran

	Observed Frequency of citations (Fo)	Expected Frequency of citations (Fe)
Number of citations to published resources of agricultural school of FUM	867	991
Number of citations to published resources in Iran	1115	991
Total	1982	1982

X = 31.02

Since the chi-square value exceeds the critical chi-square with degrees of freedom 1 and 5% error (3.84) is larger, we conclude that difference between the observed number of citations to published resources of agricultural school of FUM and the observed number of citations to published resources in Iran is significant and with 95% confidence could be extended to the population as a whole.

- Table 5: The chi-squared test is used to determine whether there is a significant difference between the observed citations to [agricultural school of FUM published resources & published resources in Iran] and published resources out of Iran

	Observed Frequency of citations (Fo)	Expected Frequency of citations (Fe)
Number of citations to [agricultural school of FUM published resources & published resources in Iran]	1982	5843
Number of citations to published resources out of Iran	9704	5843
Total	11686	11686

X = 5102.62

Since the chi-square value exceeds the critical chi-square with degrees of freedom 1 and 5% error (3.84) is larger, we conclude that difference between the observed number of citations to [agricultural school of FUM published resources & published resources in Iran] and the observed number of citations to published resources out of Iran is significant and with 95% confidence could be extended to the population as a whole.

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

- Table 6: Distribution of citation to different types and formats of resources

	Citations to resources					
	Printed		Electronic		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Books	2589	22.43	1	0.68	2590	22.16
Journals	7173	62.15	102	69.86	7275	62.25
Thesis	280	2.42	0	0	280	2.39
Conferences' articles	1056	9.15	5	3.42	1061	9.07
Research reports	239	2.07	0	0	239	2.04
Newsletter	13	0.11	0	0	13	0.11
Annuals	32	0.27	0	0	32	0.27
Bulletins	29	0.25	0	0	29	0.24
Reviews	18	0.15	0	0	18	0.15
Others	111	0.98	38	26.02	149	1.27
Total	11540	98.75	146	1.24	11686	100

Since, there were not enough citations to FUM published journals, so what is provided here are the tables which represent the identified core journals in every field, in Iran and out of Iran.

- Table 7: core journals in irrigation engineering, published in Iran and out of Iran

	Rank	Title of Journals	Number of citations
Journals published in Iran	1	Ab-o-Fazelab	7
	1	Ab-o-Khak	7
	2	Ab, Khak, Mashin	6
Journals published out of Iran	1	Water Supply & Management	92
	2	Advances in Water Resources	87
	3	Irrigation and Drainage Systems	40
	3	Agricultural water management	40
	4	Water and Water Treatment Journal	35

- Table 8: core journals in soil science, published in Iran and out of Iran

	Rank	Title of Journals	Number of citations
Journals published in Iran	1	Ab-o-Khak	11
Journals published out of Iran	1	Canadian Journal of Soil Science	68
	2	Geoderma International Journal of Soil Science	67
	3	Soils and fertilizers	45
	4	Soil use & management	29

- Table 9: core journals in agronomy, published in Iran and out of Iran

	Rank	Title of Journals	Number of citations
Journals published in Iran	1	Pazhoohesh-e-Keshavarzi	21
	2	Oloom-e-Sanaye-e-Keshavarzi	12
Journals published out of Iran	1	International Agricultural Engineering Journal	109
	2	Journal of agricultural and food chemistry	96
	3	American Potato Journal	73
	4	Agricultural Engineer	52
	4	Agricultural systems	52

- Table 10: core journals in animal science, published in Iran and out of Iran

	Rank	Title of Journals	Number of Citations
Journals published in Iran	1	Taghziye-e-Dam-o-Toyoor	31
	2	Damparvaran	11
	2	Barzegar	11
Journals published out of Iran	1	Nutrition research	122
	2	Journal of Diary Research	105
	3	Journal of Animal Science	101
	4	Australian Journal of Diary Technology	64

- Table 11: core journals in food science & technology, published in Iran and out of Iran

	Rank	Title of Journals	Number of Citations
Journals published in Iran	1	Sanaye Ghand-e- Iran	7
Journals published out of Iran	1	British journal of nutrition	39
	2	Nutrition Reviews	36
	3	Food market commentary	20
	3	Food Science & Technology	20

- Table 12: core journals in plant pathology, published in Iran and out of Iran

	Rank	Title of Journals	Number of Citations
Journals published in Iran	1	Iranian Journal of Botany	15
	2	Giyah-e-Bartar	9
	3	Rostaniha	7
Journals published out of Iran	1	American Journal of Botany	34
	2	Plant disease	31

- Table 13: Frequency distribution of number of citations to electronic and printed resources

	Number of citations	Percentage of citations
Printed resources	11540	98.75
Electronic resources	146	1.24
Total	11686	100

- Table 14: The chi-squared test is used to determine whether there is a significant increase in citations to electronic resources by passing the time.

Year	Observed Frequency of citations to electronic resources(Fo)	Expected Frequency of citations to electronic resources (Fe)
2000	0	29.2
2001	2	29.2
2002	8	29.2
2003	16	29.2
2004	120	29.2
Total	146	146

X = 358.23

Since the chi-square value exceeds the critical chi-square with degrees of freedom 4 and 5% error (9.49) is larger, we conclude that difference between the observed number of citations to citations to electronic resources in years 2000, 2001, 2002, 2003 and 2004, is significant and with 95% confidence could be extended to the population as a whole. So, there is a significant increase in citation by passing the time.

- Table 15: The chi-squared test is used to determine whether there is a significant difference between the observed frequency of citations to electronic resources published by agricultural school of FUM, observed frequency of citations to electronic resources published in Iran, and observed frequency of citations to electronic resources published out of Iran

	Observed Frequency of citations to electronic resources(Fo)	Expected Frequency of citations to electronic resources (Fe)
Citations to electronic resources published in agricultural school of FUM	0	48.6
Citations to electronic resources published in Iran	13	48.6
Citations to electronic resources published out of Iran	133	48.6
Total	146	146

X = 221.87

Since the chi-square value exceeds the critical chi-square with degrees of freedom 2 and 5% error (5.99) is larger, we conclude that difference between the 3 levels citations which are observed frequency of citations to electronic resources published by agricultural school of FUM, observed frequency of citations to electronic resources published in Iran, and observed frequency of citations to electronic resources published out of Iran is significant and with 95% confidence could be extended to the population as a whole.

- Table 16: Geographical distribution of citations

Fields / Countries	Irrigation		Soil science		Agronomy		Animal science		Food science & technology		Plant pathology		Total	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
USA	441	47.01	644	57.34	2216	50.58	1000	35.02	473	34.17	493	49.05	5267	45.07
UK	126	13.43	149	13.26	917	20.93	339	11.87	617	44.58	231	22.98	2379	20.35
Iran	261	27.82	247	21.99	497	11.34	343	12.01	171	12.35	131	13.03	1650	14.11
Australia	60	6.39	32	2.84	443	10.11	1013	35.48	21	1.51	15	1.49	1584	13.55
Canada	37	3.94	50	4.45	259	5.91	135	4.72	99	7.15	15	1.49	595	5.09
India	13	1.38	1	0.08	49	1.11	25	0.87	6	0.43	120	11.94	214	1.83
Total	938	8.02	1123	9.6	4381	37.48	2855	24.43	1384	11.84	1005	8.6	11686	100

Geographical distribution of citations, was not wide with 6 countries represented, led by the USA (45.07%), the UK (30.35%), Iran (14.11%), Australia (13.55%), Canada (5.09%) and India (1.83%).

- Table 17: Language distribution of citations

Fields / Languages	Irrigation		Soil science		Agronomy		Animal science		Food science & technology		Plant pathology		Total	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
English	676	72.06	876	78	3884	88.65	2512	87.98	1216	87.86	876	87.16	10038	85.89
Farsi	262	27.93	247	21.99	497	11.34	343	12.01	168	12.13	131	13.03	1648	14.1
Total	938	8.02	1123	9.6	4381	37.48	2855	24.43	1384	11.84	1005	8.6	11686	100

Language distribution of citations was limited to English (85.89%) and Farsi (14.01%).

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

Results:

- Between 6 fields of agriculture studied, agronomy and animal science theses, with 411(47.4%) and 201(23.18%) citations had the most number of citations to published resources of agricultural school of FUM, respectively.
- Between 6 fields of agriculture studied, agronomy, soil science, irrigation engineering and animal science theses with 279(25.02%), 238(21.34%), 200(17.93%) and 175(15.69%) citations had the most number of citations to published resources in Iran, respectively.
- Between 6 fields of agriculture studied, agronomy, animal science and food science theses with 3691(38.03%), 2479(25.54%) and 1198(12.34%) citations had the most number of citations to published resources out of Iran, respectively.
- There was a significant difference between the number of citations to published resources of agricultural school of FUM and the number of citations to published resources in Iran
- There was a significant difference between the number of citations to [agricultural school of FUM published resources & published resources in Iran] and published resources out of Iran
- Distribution of citation to different types and formats of resources showed that between printed materials, journals with 7173 citations (62.15%), books with 2589 citations (22.43%) and conferences' articles with 1056 citations (9.15%) allocated the most citations to them, respectively. Between electronic materials, journals with 102 citations (69.86%) and conferences' articles with 5 citations (3.42%) allocated the most citations to them, respectively.
- Core journals published in Iran and out of Iran in every field, were determined.
- Frequency distribution of citations showed that the printed materials allocated 11540 citations (98.75%) of citations to them, while electronic resources allocated 146 citations (1.24%) to them.
- There was a significant increase in citations to electronic resources by passing the time.
- There was a significant difference between the frequencies of citations to electronic resources published by agricultural school of FUM, frequency of citations to electronic resources published in Iran, and frequency of citations to electronic resources published out of Iran.
- Geographical distribution of citations, was not wide with 6 countries represented, led by the USA (45.07%), the UK (30.35%), Iran (14.11%), Australia (13.55%), Canada (5.09%) and India (1.83%).
- Language distribution of citations was limited to English (85.89%) and Farsi (14.01%).

Suggestions:

Considering the importance of research in universities and for optimum use of available resources and to encourage researchers to use these resources, following suggestions are offered:

- Understanding the importance of citations in tracking related work by other researchers, using the standard formats to cite sources is needed, an instructional course in this subject for students is recommended.

Dabiri, Azam (2006) Citation analysis and reliance measurement on different information resources: A survey of masters' theses. Master thesis article.

- Since citations to Farsi (Persian) journals were few, it is recommended to take a survey about the needs of users to Farsi journals available in the libraries of the FUM and also eliminating or replacing some of them could be considered in future acquisitions.
- Since citations to electronic resources were a small number of citations, language training courses as well as courses for databases search for students is recommended.
- Since the main source of agricultural students to write theses, was English journals therefore, allocating funds for providing this resources is recommended.

References:

1. Diodato, V. (1994). ***Dictionary of bibliometrics.*** New York: Haworth Press.
2. Garfield, E.; Malin, M.V.; Small, H. (1978). Citation data as science indicators. In: ***Toward a metric of science: the advent of science indicators*.** Ed. by Y. Elkana et al. New York: John Wiley, 179-207.
3. Garfield, E. (1979). Citation ***Indexing - Its theory and application in science, technology and humanities (Information Science S).*** New York: John Wiley & Sons Inc.
4. Lancaster, E.W., & Sarada Ranganathan Endowment for Library Science (1991). ***Bibliometric methods in assessing productivity and impact of research.*** Bangalore [India]: Sarada Ranganathan Endowment for Library Science.
5. Rochester Maxine K. (1996). Professional Communication through Journal Articles. ***Australian Academic & Research Libraries***, 27: 3, 191-199.
6. Smith, Linda C. (1981). Citation analysis. ***Library Trends,*** 30: 1, 83–106.
7. Ziman John M. (1968), ***Public knowledge: An essay concerning the social dimension of science***. Cambridge, Cambridge university press, p.58.